

[0001] The invention relates to an equipment to the use with the ligature of intramuralen Arterien in hollow organs, which and into the hollow organ, in particular the Rektum tube which can be introduced covers an handle, whereby the equipment exhibits a proximal range, within which the handle is arranged, and a distal range, within which an ultrasonic probe for the localization of a Arterie and a treatment opening are arranged, and whereby a lighting equipment is intended.

[0002] A such, also equipment called ultrasonic Proktoskop is well-known from the US-5,570,692 A. By the open proximal end in the Anus introduced tube the treatment opening can be seen, via which a ligature of the intramuralen Arterie takes place. The distal end tube is sealed by a removable flap. In this flap is arranged toward lamp pointing to the proximal end. For the replacement of the lamp the flap is unscrewable.

[0003] At this well-known equipment it is unfavorable that it comes by toward light withdrawing to the proximal end to a glare for the person who can be treated. Further the purification and sterilisation of the equipment are only reduced possible and relatively complex. For this the flap must be unscrewed from tube and be removed the lamp and a silicone seal. These not heatproof parts can be only chemically disinfected in the consequence, which does not represent genuine sterilisation. The equipment is not superheated steam sterilizable against it. If necessary a gas sterilization can be accomplished, which is used comparatively rarely due to its danger potential and is often forbidden. The single components, in particular the silicone seal, taken apart to the purification and disinfection, can be lost further also easily.

[0004] For the localization of a Arterie the reflected signal received from the ultrasonic probe is evaluated and converted into an acoustic signal. If by the ultrasonic probe a Arterie is detected, then this can of the treating person over a loudspeaker and/or. put on headphones as Schallsignal to be noticed. Hieran it is unfavorable that background noises can impair the positioning of a Arterie.

[0005] Task of the invention is it, an improved equipment of the kind initially specified ready sets, which is simply developed and more operated.

[0006] In accordance with a first aspect this succeeds to the invention thus that the lighting equipment covers a light guidance means, by means of the light from the proximal to the distal range of the equipment is led. Thereby a simply developed ultrasonic Proktoskop can be made available, with which also a glare of the treating person can be practically switched off. Due to its simple and economical structure the ultrasonic Proktoskop can be trained as once usable equipment, which becomes after the operation entsorgt. Further an equipment according to invention can be also multiple superheated steam sterilizable trained, for example five to ten times.

[0007] In first is the light guidance means an optical fiber preferred embodiment of the invention, from whose distal end light is radiated for treatment opening. Preferring way is arranged here the radiation distal of proximal after, to particularly good illuminating of the treatment range sign-lies to the longitudinal axis tube favorable-proves.

[0008] In accordance with a further preferential embodiment of the invention the light guidance means is formed by tube consisting of a transparent material, in which by its proximal end face by at least three LEDs light one irradiates and into the distal range tube one leads. The lighting lead takes place here under at least more partly - total reflexion at the outside and internal lateral surface tube. In this way light can be led in particularly simple way to the distal range tube. Is necessary thereby no additional light guide. , As with the state of the art, a bulb is just as few in the distal range tube including associated, too these prominent current supply lines necessary. Favorable way is roughened up the internal lateral surface tube in a range, which faces a treatment opening planned in the cover tube. Within a such roughened up range the total reflexion is switched off at least partly and light steps increased out.

[0009] In accordance with a further aspect of the invention it is intended with an equipment of the kind initially specified that in the range that is intended the user turned proximal side of the equipment an optical indicator to the displaying of the positioning of a Arterie. This optical indicator is prefer-proves additionally to the indicating by acoustic means available. The positioning of a Arterie is facilitated by this optical indicator, in particular with existing background noises. The optical indicator according to invention is thereby directly in the field of vision of the treating person. Favorable way is trained the optical indicator in form of a light emitting diode bar.

[0010] Preferably that is intended the user turned proximal side of the equipment a power switch for the ultrasonic probe in the range. This switch is thus in the sterilized range, so that the ultrasonic probe, and in particular their indicating by acoustic means, by which treating person during the treatment as required in-/can be switched off.

[0011] Further advantages and items of the invention are described in the following on the basis the embodiments represented in the enclosed design. In the design show:

Fig. 1 a perspective display of a first embodiment of the invention;
 Fig. 2 a cut by the vertical longitudinal centre plane of the equipment of Fig. 1;
 Fig. 3 an opinion on the treating person turned the proximal side of the equipment of Fig. 1;
 Fig. 4 a perspective preparation of portions of a modified embodiment of the invention pulled apart according to kind of an explosion representation (without electrical parts);
 Fig. 5 a perspective display of a needle holder with an inserted needle to the use with the Proktoskop according to Fig. 1 or Fig. 4;
 Fig. 6 an increased detail B von Fig. 5;
 Fig. 7 to Fig. 9 work procedures with the ligature of a Arterie (cross sections by the tube);
 Fig.10 a schematic display of the equipment attached to a tax and an evaluation unit;
 Fig.11 a perspective display of a further embodiment of the invention;
 Fig.12 a cut by a longitudinal centre plane of the embodiment in accordance with Fig. 11, whereby in schematic way setting of a rubber band ligature is represented;
 Fig.13 a longitudinal middle section along the line A-A von Fig. 14 of a further embodiment of the invention;
 Fig.14 an opinion on the treating person turned the proximal side of the equipment of Fig. 13 and
 Fig.15 a perspective display according to kind of an explosion representation of the equipment according to Fig. 13 (without feeder lines to the cabling of the electrical parts).

[0012] Resembles and/or. at least function-same parts are provided with the individual embodiments with the same reference symbols.

[0013] A according to invention according to equipment in the Fig. 1 to 3 represented embodiment covers in the Anus of the person who can be treated tube 1 which can be introduced and an handle 2. The tube 1 closed is open at its treating person turned proximal end and at its distal end, whereby he tapers himself to his proximal end trichterförmig widened and within the range of his distal end to a rounded off point. The equipment consists of a left and a right half shell, which welded with one another or stuck together. With each the two half shells is einstückig with the half shell of the handle trained the appropriate half shell tube.

[0014] Within a distal range 4 of the equipment and/or. tube 1 is intended one diagonally forward (distal) radiating ultrasonic probe 6 and one distal before the ultrasonic probe lying treatment opening in the Tubusmantel 40. In the proximal range of the equipment a white light LED 5 is arranged. These LED 5 is before the proximal end along the internal lateral surface 8 tube 1 of the running light pipe 10 one arranges, by means of the light by the proximal range 3 to the distal range 4 of the equipment one leads. At the internal lateral surface 8 of the 1 the optical fiber is fastened tube by means of tie-clip parts 11. By the distal end of the light pipe 10 among other things light becomes toward for treatment opening 7 radiated. In order to arrange this radiation more strongly, the distal end of the light guide can be accordingly tapered 10. The radiation of the light is arranged distal of proximal after. By an appropriate chamfer of the distal end of the light pipe can this radiation sign-lie to the longitudinal axis tube to be aligned.

Within a distal range 4 of the equipment or tube 1 is provided one diagonally forward radiating ultrasonic probe 6 and one distal treating opening (7) before the ultrasonic probe in the tubus mantel (40) → mantel of the tube 2

[0015] On the treating person turned proximal side of the Proktoskops a printed circuit board 12 is fixed, which carries turned in/circuit breaker 13 as well as an optical indicator for the user beside the white light LED 5 in form of a light emitting diode bar 14, which is formed here by four individual light emitting diodes 15.

[0016] The current supply of the ultrasonic probe 6 and the transmission of the signal of the ultrasonic probe are made by electrical wires 17, which run within a groove in the internal lateral surface 8 tube of the 1. These electrical conduits 17 as well as with in/circuit breaker 13 and the light emitting diode bar 14 connected electrical lines are connected by a lead 16 with a tax and an evaluation unit the 18 (see. Fig. 10). The current supply of the tax and evaluation unit 18 can be made by a power pack 19 or by means of batteries. For the evaluation of the ultrasonic signals the tax and evaluation unit covers a minicomputer. An indicating by acoustic means is spent over headphones 20. The minicomputer can take over also further tasks, as for example the storage from data to the documentation of the Arteriendurchflusses before and after the ligature (documentation of the operation), possibly. also with indication of angle positions of the Arterien.

[0017] The interior 21 tube of the 1 open to the proximal side is locked distal by a distal wall 22. This distal wall 22 exhibits a shoulder with a serrated guidance surface 23. This guidance surface 23 extends essentially toward the linear dimension of the treatment opening 7, is however evenly trained. In the wall 22 further one is parallel to the guidance surface 23 running groove 24 intended.

[0018] A needle holder to the use with this Proktoskop is in the Fig. 5 and 6 represented. In the place, in which the round needle is to be placed 28 in the needle holder 25, an appropriate groove 24 is trained. At the point of the needle holder 25 a toothed wheel 26 is fixed, which forms a serrated beginning of the needle holder circular in the cross section. Over the toothed wheel a central pencil 27 manages 26.

[0019] After the location of a intramuralen Arterie becomes the ligature of the Arterie of the needle holders according to Fig. 7 inserted into the Proktoskop, whereby the pencil 27 into the guide groove 24 rises up and the toothed wheel 26 with the serrated guidance surface 23 combs. In the consequence the needle holder becomes 25 around the longitudinal axis of the gear 26 and/or. the pencil 27 turned, like this in the Fig. 8 and 9 is represented. Here a simultaneous Längsverschiebung of the needle holder 25 takes place along the guidance surface 23 and/or. the guide groove 24. It takes place via it an accurate slide mechanism of the round needle 28 during the ligature.

[0020] A somewhat modified embodiment of the invention is in Fig. 4 represented, whereby the electrical parts (ultrasonic probe, white light LED, light emitting diode bar, power switch and their cabling) are for the sake of simplicity omitted. With this embodiment of the invention the handle 2 fixed at a connecting piece 29 is. The tube consists weldable half shells of two stick together with one another or. A light guide 10 runs in a groove at the internal lateral surface tube and is fastened with tie-clip parts 11 to tube the 1. The connection tube of the 1 with the connecting piece 29 takes place according to kind of a bayonet fixing, i.e. the tube into the connecting piece 29 one puts and one rotates afterwards around his longitudinal axis. At tube the 1 in close proximity to its proximal end a ring flange 30 managing over the outside lateral surface tube 1 is intended. At this contacts can be arranged, which manufacture electrical contacting between the wires resuming in tube running electrical wires for the ultrasonic probe and the appropriate by the connecting piece 29 and the handle 2.

[0021] With this embodiment of the invention for example the handle can be reusable trained 2 with the connecting piece 29 and the electrical parts planned therein (white light LED for lighting, light emitting diode bar, power switch) superheated steam sterilizable and thus, while the tube 1 and the parts built into it (light guides 10, ultrasonic probe and connecting cables) a painting hurry to represent.

[0022] A further training form of the invention is in the Fig. 11 and 12 represented. This training form of the invention corresponds in the Fig. 1 to 3 shown with the difference that the distal end tube of the 1 is open. This open distal end forms here the treatment opening 7. A such ultrasonic Proktoskop can be used in particular to the lead-through of a rubber band ligature. The treatment procedure is here in Fig. 12 schematically drawn in. With the

Proktoskop introduced to the Anus a Arterie is located. The radiation of the ultrasonic probe takes place here diagonally forward. An instrument 31 for setting a ligature by means of a rubber band 32 is introduced to the tube 1. This instrument is in Fig. 12 only schematically suggested. It covers a suction tube for sucking in the Mukosa 33, which contain the too ligierende Arterie. The Arterie tied by means of one before on the instrument 31 geladenden rubber band 32. Such instruments for setting rubber band ligatures are admitted and form not the subject-matter of this invention and are therefore not in detail described.

[0023] A further, particularly preferential embodiment of the invention are in the Fig. 13 to 15 represented. The handle 2 is fixed at the connecting piece 29 consisting of the two parts 34, 35. The tube 1 is connected removable with the connecting piece 29. For this that exhibits part 35 an external thread 36, on which an union nut is screw onable 37, which spreads a ring flange 38 at the exterior and in the proximity of the distal end tube of the 1. As in the embodiments already described an optical indicator is intended in form of a light emitting diode bar 14 to the displaying of the positioning of a Arterie as well as a power switch 13 for the ultrasonic probe on the treating person turned the proximal side of the Proktoskops.

[0024] The tube 1 a light guidance means consists, by means of the light from the proximal to the distal range of the Proktoskops is led of a transparent material and forms. Composition three white light LEDs 5 light is irradiated by the proximal front surface 39 of the Tubusmantel 40. These three LED 5 are beabstandet in circumferential direction of the Tubusmantels around 120 DEG from each other in each case. Composition total reflexion is led the light irradiated in the Tubusmantel into the distal range 4 of the equipment. In the treatment opening 7 the internal lateral surface 8 is roughened opposite range up 41 tube, so that in this place increases light withdraws, which the treatment opening illuminated. Further a range 42 roughened up at the distal front wall 43 is. It becomes thereby the guide groove 24 particularly well recognizably, into which the point of a needle holder (here without toothed wheel) is to be inserted.

[0025] This embodiment of the invention can be trained again as once usable part or as heissdampfsterilisierbares part. Here the entire Proktoskop can be superheated steam sterilizable trained or only parts of it, for example the connecting piece 29 with the handle 2 and the union nut 37 and the parts built in the connecting piece.

[0026] Suitable materials, from which the tube is producible, are in particular polycarbonate or polysulphone. Polycarbonate is for example available under the material designations ?APEC? or ?MAKROLON?.

[0027] With the represented embodiment according to the Fig. 13 to 15 runs the electrical lines 17 to the terminal of the ultrasonic probe 6 at the exterior tube of the 1, and by a groove in the ring flange 38. At that the proximal end turned side of the ring flange 38 contact points can be intended for the contacting of these wires 17. The groove in the ring flange 38 can serve simultaneous as centering groove for the tube 1.

[0028] Different modifications of the embodiments shown are conceivable and possible, without leaving the range of the invention. For example could in the embodiment in accordance with the Fig. 13 to 15 likewise a serrated guidance surface for a toothed wheel of a needle holder intended its. The tube could be also with this embodiment in principle einstückig with the handpiece trained.

Putting one to the reference numbers:

1				Tube
2				Handle
3				range
4		proximal		range
5		distal		LED
6		Ultrasonic		probe
7		Treatment		opening
8				surface
9	internal		lateral	surface
10	expresses		lateral	guide

Light

11			Tie-clip		part
12		Printed		circuit	board
13			Power		switch
14	Light		emitting	diode	bar
15		Light		emitting	diode
16					Lead
17			electrical		wire
18	Tax		and	evaluation	unit
19			Power		pack
20					Headphone
21					Interior
22					Wall
23		serrated		guidance	surface
24			Guide		groove
25			Needle		holder
26			Toothed		wheel
27					Pencil
28			Round		needle
29			Connecting		piece
30			Ring		flange
31					Instrument
32			Rubber		band
33					Mukosa
34					Part
35					Part
36			External		thread
37			Union		nut
38			Ring		flange
39			Front		surface
40					Tubusmantel
41					Range
42					Range
43	Front wall				